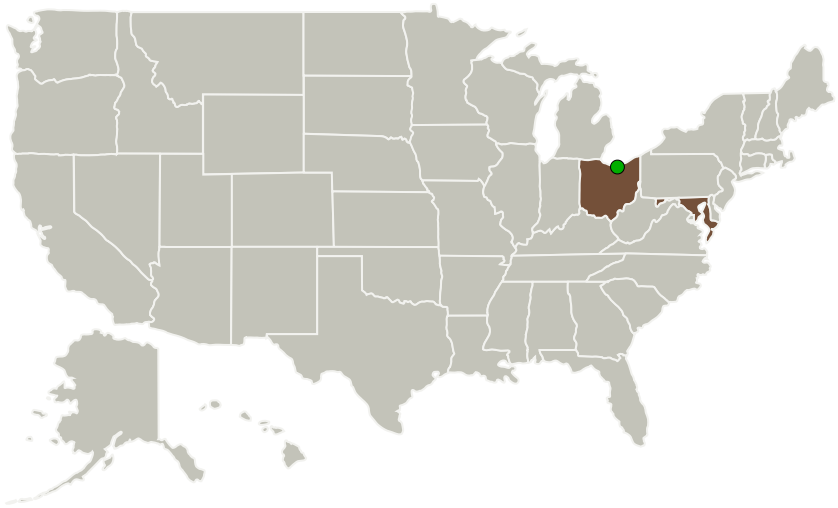
Improved CVD Coatings for Carbide Based Nuclear Thermal Propulsion Fuel Elements, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

One of the great hurdles to further development and evaluation of nuclear thermal propulsion systems is the issue surrounding the release of radioactive material from the fuel during ground testing and its subsequent impact on test facility siting and operation. Therefore, the development of a crack resistant coating system on nuclear thermal propulsion fuel elements that is insensitive to hydrogen corrosion and erosion is considered enabling. Technology Assessment & Transfer Inc. (TA&T) proposes a systematic approach for CVD deposition and evaluation of a family of niobium carbide (NbC) coating systems for both uranium carbide-zirconium carbide solid solution [(U,Zr)C] and advanced triple carbide (uranium carbide-ziconium carbide-niobium carbide) solid fuel elements designed for use in space nuclear power and propulsion reactors. These refractory metal coating systems will be evaluated in high temperature hydrogen and helium in concert with a preliminary performance modeling effort.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Technology Assessment & Transfer, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Annapolis, Maryland
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Maryland	Ohio

Project Transitions

February 2011: Project Start

August 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138627)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Technology Assessment & Transfer, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

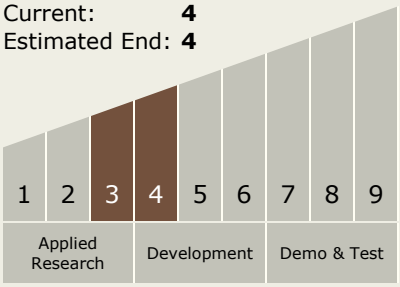
Carlos Torrez

Principal Investigator:

Larry Fehrenbacher

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.4 Other Advanced Propulsion Approaches

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System